

**WHAT IS CLAIMED IS:**

1. A piston pump comprising: a cylindrical cylinder; a piston reciprocating inside the cylinder; a suction port through which gas sucked into  
5 a pump chamber defined by the cylinder and the piston passes; and an exhaust port through which the gas discharged from the pump chamber passes;

wherein the piston pump sucks the gas through the suction port and discharges the gas through the exhaust port as the volume of the pump  
10 chamber is changed by reciprocating motion of the piston;

wherein the suction port is arranged at a top of the piston with a suction valve, which opens as the volume of the pump chamber is increased;  
and

wherein the exhaust port is arranged at a top of the cylinder with an  
15 exhaust valve, which opens when the volume of the pump chamber is decreases.

2. The piston pump according to claim 1, wherein the suction valve is arranged on a side of the pump chamber.

20

3. The piston pump according to claim 1 or 2, wherein the exhaust valve is arranged on an opposite side to the pump chamber of the top of the cylinder.

25

4. The piston pump according to any one of claims 1 to 3,  
wherein the piston has an opening communicating with the suction port on an opposite side to the pump chamber,

wherein the opening is arranged so as to allow air sucked through the suction port into the pump chamber to pass and a plenum capable of storing the air to communicate with the opening; and

5        wherein the plenum is encompassed by an enclosure having at least one plenum suction port.

5.        A piston pump including a cylindrical cylinder having a top portion; a piston reciprocating inside the cylinder; a suction port through which gas sucked into a pump chamber defined on a side of the top portion of the cylinder by the cylinder and the piston passes; and an exhaust port through 10 which the gas discharged from the pump chamber passes;

wherein the piston pump sucks the gas from the suction port and discharges the gas through the exhaust port as a volume of the pump chamber is changed by reciprocating motion of the piston;

15        wherein the suction port is arranged at the top portion of the cylinder with a suction valve, which opens when the volume of the pump chamber is increased; and

the exhaust port is arranged at the piston with an exhaust valve, which opens when the volume of the pump chamber is decreased.

20        6.        The piston pump according to claim 5, wherein the suction valve is arranged on a side of the pump chamber.

7.        The piston pump according to any one of claims 1 to 6,  
25        wherein the piston engages with a coupling member in such a manner that the coupling member is capable of turning in a circumferential direction thereof, and

wherein the coupling member is connected to a connecting member driven such that the engaged piston is reciprocated inside the cylinder.

8. The piston pump according to claim 7,

5 wherein the piston comprises therein a recess portion formed continuously in the circumferential direction of the piston and engaged with the coupling member, the recess portion including at least a part of a first predetermined spherical surface;

10 wherein the coupling member has a projection portion formed continuously in the circumferential direction such that the projection portion corresponds to the recess portion, the projection portion including at least a part of a predetermined second spherical surface to engage with the recess such that the projection portion is capable of turning in the circumferential direction and in an axial direction; and

15 wherein the piston reciprocates when the projection portion and the recess portion engage with each other so as to transmit driving force from the connecting member to the piston.

9. The piston pump according to any one of claims 1 to 8,  
20 wherein at least a portion of the piston sliding on an inner wall of the cylinder is composed of a self-lubricating material.

10. The piston pump according to any one of claims 1 to 9,  
25 wherein the cylinder comprises a top plenum defined by a top enclosure fixed to the top portion of the cylinder and a motor housing fixed at a position spaced apart by a predetermined distance from the top portion such that the cylinder is connected and fixed to at least a part of the motor housing;

wherein the motor housing is composed of a base portion fixed to the cylinder such that the base portion holds a motor for driving the piston so as to reciprocate inside the cylinder and a cover portion disposed along the base portion such that the cover portion fastens the motor by sandwiching the motor  
5 with the base portion; and

wherein the cover portion and the base portion are engaged with a connecting mechanism capable of engagement and disengagement.

11. The piston pump according to any one of claims 1 to 10,  
10 wherein the piston pump is connected to a blood pressure monitor.

12. A piston pump in which a piston reciprocates inside a cylinder having a cylinder head for pressurization, the piston pump is characterized in that:

15 (1) an inner diameter of the cylinder is not exceeding approximately 20 mm;

(2) a throughput of the piston pump is not exceeding approximately 6.0 liters/min;

(3) pressurization characteristics thereof can be maintained even after 20 approximately 10,000 reciprocating motions of the piston; and

(4) the cylinder and the cylinder head are non-mechanically coupled.

13. A method of producing a piston pump including a cylindrical cylinder, a piston reciprocating inside the cylinder; a suction port through which 25 gas sucked into a pump chamber defined by the cylinder and the piston passes and an exhaust port through which the gas discharged from the pump chamber passes; the method comprising the steps of:

producing a piston pump pre-assembly comprising the cylinder and a cylinder top portion in which the exhaust port is formed;  
conducting a leakage inspection of the piston pump pre-assembly; and  
producing a piston pump by further assembling components to the  
5 piston pump pre-assembly.

14. A blood pressure monitor utilizing the piston pump according to  
any one of claims 1 to 12.